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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/044,799	01/10/2002	Jun Seo	8750-018	8382

7590 05/09/2003  
MARGER JOHNSON & McCOLLOM, P.C.  
1030 SW Morrison Street  
Portland, OR 97205

EXAMINER

LEE, GRANVILL D

ART UNIT PAPER NUMBER

2825

DATE MAILED: 05/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/044,799

Applicant(s)

SEO ET AL.

Examiner

Granvill D Lee, Jr

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 10 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-14 is/are rejected.
- 7) ☒ Claim(s) 4 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 and 5-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (US Pat. 6,355,547) in view Doan (US Pat. 6,303, 958).

In view of these claims (esp. clm. 1), Lee et al. makes a self-aligned contact (SAC) for a device by forming a gate stack (Fig. 5a #208) on a semiconductor substrate, a conformal dielectric layer (#209) over the gate stack, applying an etch-stop material layer (#210) over the conformal dielectric layer, and then eventually etching back the conformal dielectric layer to form a gate spacer (Fig. 9). However, Lee et al. fails to remove the upper portion of the etch-stop material to expose the conformal dielectric layer and then etching the conformal dielectric layer.

Doan et al. in a process of making a capacitor device, shows the removal of a portion of the etch-stop material (Fig. 7 #120 & 121) to have remaining the exposed portion of the dielectric layer, which it too is etched away (Fig. 8). Therefore, it would have been obvious to a person of ordinary skill in the

art at the time of the invention to modify Lee et al. with that of Doan in order to achieve a better etch result having selected materials that now lend themselves to preferred fluorine etches (like CF<sub>4</sub>, CHF<sub>3</sub>, and HBr) (Col. 7 line 55-Col. 8 line 10).

In view of claims 5-6, Lee et al. uses a organic photoresist material (Fig. 5a #210) to form an etch-stop.

In continued view of claim 7, Doan uses a mixture of fluorine etch, like CF<sub>4</sub> or CHF<sub>3</sub> and HBr (Col. 8 lines 1-9).

In view of claim 8, Lee et al. uses the selectivity of the upper photoresist layer (#220) to etch the dielectric layer.

In view of claim 9, Lee et al. uses a thickness of 3500-5000 angstroms for the layer #212 and #240.

Claims 2-3 and 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. (US Pat. 6,355,547) in view Doan (US Pat. 6,303, 958) in further view of Hsieh et al. (US Pat Pub. 2001/0015455).

In view of these claims (esp. clm. 10), Lee et al. makes a self-aligned contact (SAC) for a device by forming a gate stack (Fig. 5a #208) on a semiconductor substrate, a conformal dielectric layer (#209) over the gate stack, applying an etch-stop material layer (#210) over the conformal dielectric layer, and then eventually etching back the conformal dielectric layer to form a

gate spacer (Fig. 9). Doan et al. in a process of making a capacitor device, shows the removal of a portion of the etch-stop material (Fig. 7 #120 & 121) to have remaining the exposed portion of the dielectric layer, which it too is etched away. However, both inventors fail to use a spacer that is lower than the hard mask. Hsieh et al. uses a hard mask (Fig. 1 #22) substantially above the spacer (sp).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Lee et al. and Doan with that of Hsieh et al. for control purposes. Whereas, normally utilized spacers act to both protect the gate against etching and for doping purposes, lower spacers now need not protect the gate if a hard mask is used (as by Hsieh et al.), but now act to control the doping of the electrodes (para. 0038).

In view of claim 2, Hsieh et al. creates a gate stack using gate oxide which is patterned (Fig. 1 #14), an electrode (#90-#93) and a hard mask (#22).

In continuing view of claim 3, Hsieh et al. uses a gate spacer lower than the hard mask.

In view of claim 13, Lee et al. forms a SAC hole adjacent to the gate stacks (Fig. 7a).

In view of claim 14, Lee et al. deposits a conductive layer within the hole and then planarizing the layer to form a contact pad (Abstr.).

***Allowable Subject Matter***

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Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Contact Information***


Any inquiry concerning this communication or earlier communications for the examiner should be directed to Granvill Lee whose telephone number is (703) 306-5865. The examiner can be normally reached on Monday thru Thursday from 7:00 am to 5:30 pm.

If attempts to reach the examiner by telephone are not successful, the examiner's supervisor, Matthew Smith can be reached on (703) 308-1323. The fax phone number for this group is (703) 308-7722.

Any inquiry of a general nature relating to status or otherwise should be directed to the receptionist whose telephone number is 703-308-1782.

Examiner  
Granvill Lee  
Art Unit 2825

GI  
4/18/03

  
MATTHEW SMITH  
SUPERVISORY PATENT EXAMINER  
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